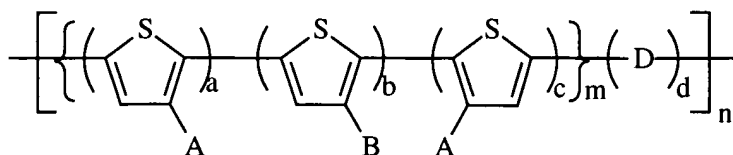


**WHAT IS CLAIMED IS:**

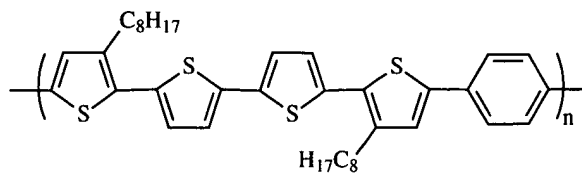
1. A polythiophene



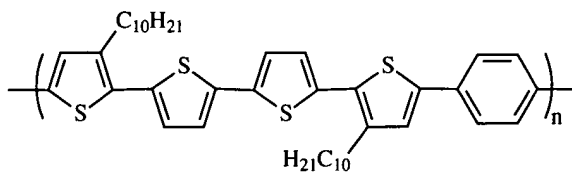
wherein A is a side chain; B is hydrogen or a side chain; D is a divalent linkage; a and c represent the number of A-substituted thienylenes; b is the number of B-substituted thienylene segments; d is 0 or 1; and n represents the degree of polymerization or the number of the monomer segments.

2. A polythiophene in accordance with **claim 1** wherein A contains from 5 to about 25 carbon atoms; said B side chain contains from zero to about 4 carbon atoms; said D is optionally comprised of a saturated moiety of alkylene, -O-R-O-, -S-R-S-, -NH-R-NH-, wherein R is alkylene or arylene, or an unsaturated moiety of arylene or heteroaromatics; a is from about 1 to about 8 and c being from 0 to about 8, and b is from zero to about 6.

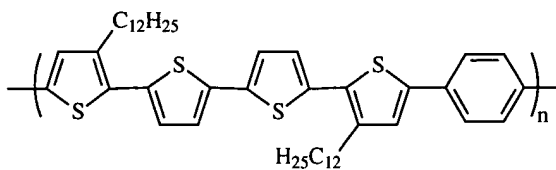
3. A polythiophene represented by



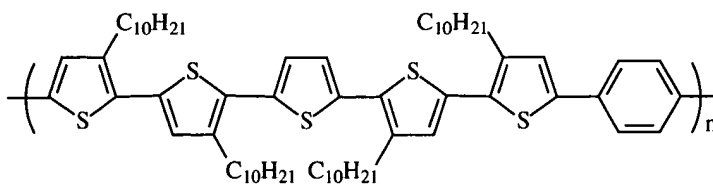
(1)



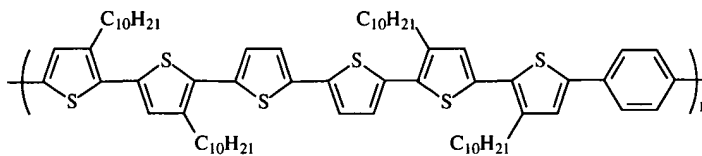
(2)



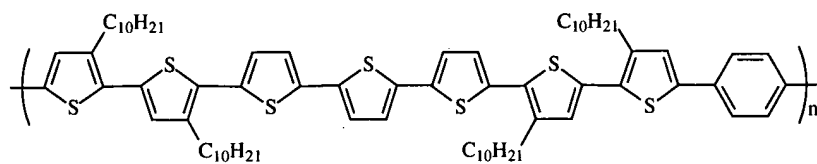
(3)



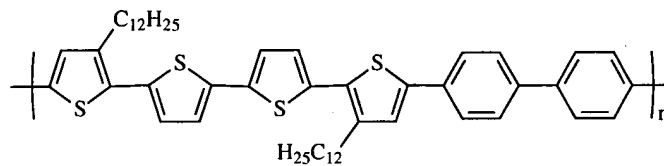
(4)



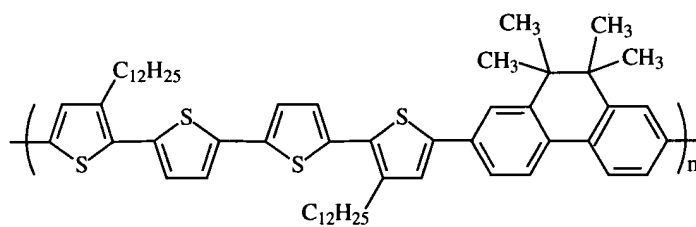
(5)



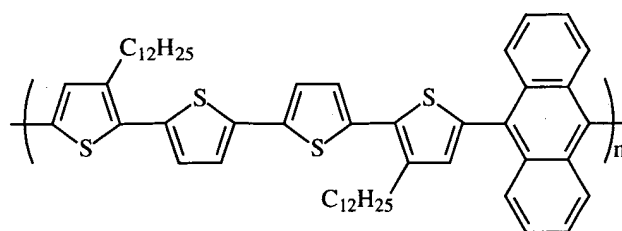
(6)



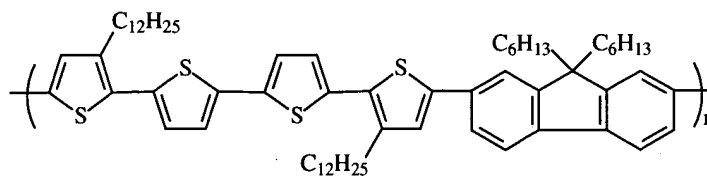
**(7)**



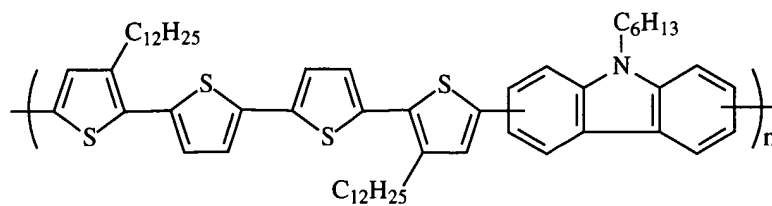
**(8)**



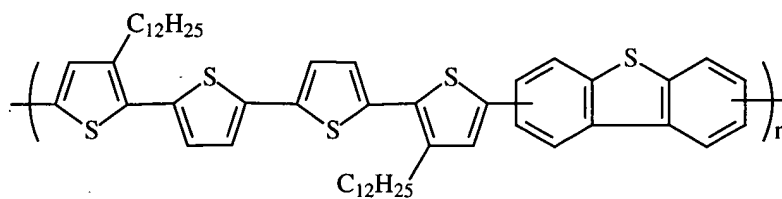
(9)



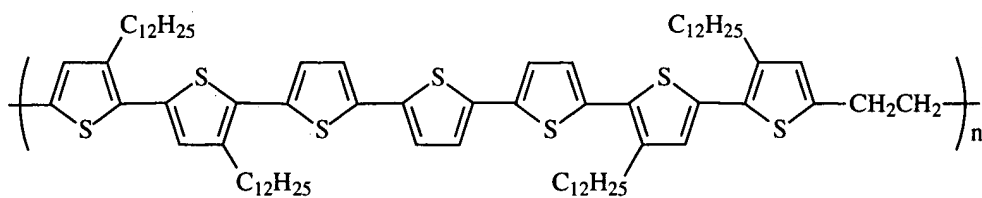
**(10).**



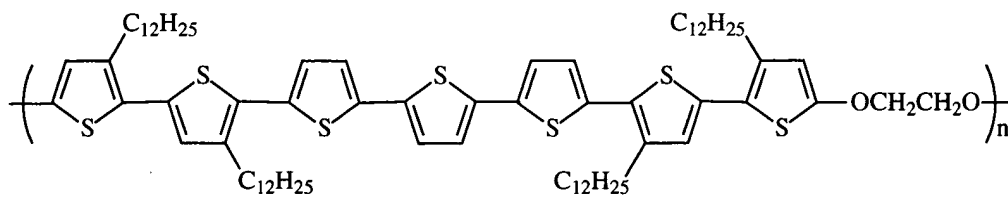
(11)



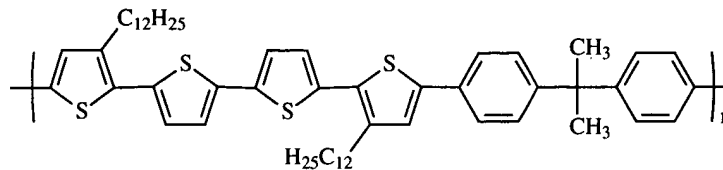
(12)



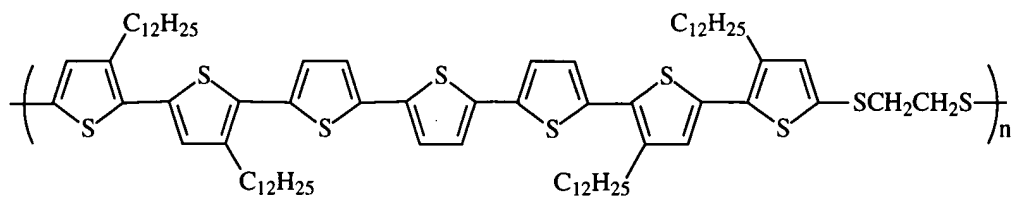
(13)



(14)

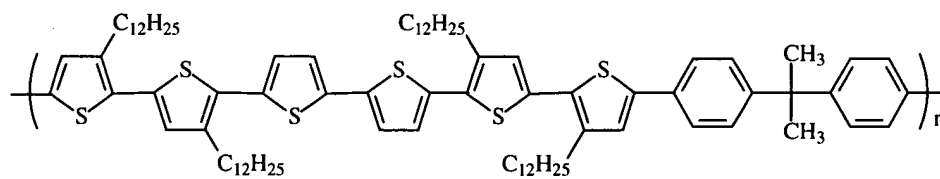


(15)



(16)

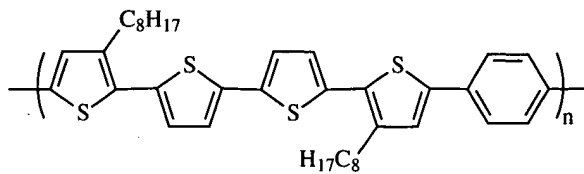
or



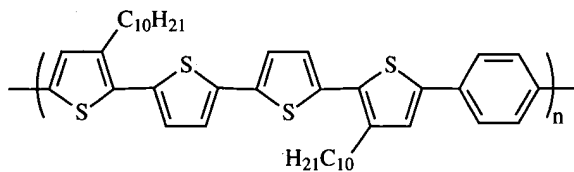
(17)

and wherein n represents the number of segments.

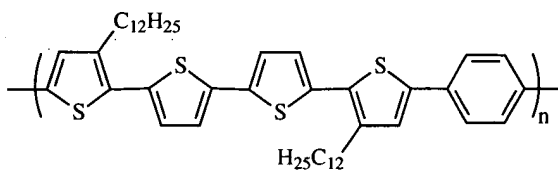
4. A polythiophene in accordance with **claim 1** wherein said polythiophene is represented by the following formulas



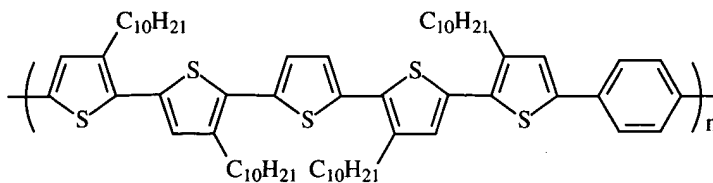
(1)



(2)



(3)



(4)

5. A polythiophene in accordance with **claim 1** wherein A is alkyl, and said B side chain is alkyl.

6. A polythiophene in accordance with **claim 1** wherein A is alkyl containing from about 1 to about 25 carbon atoms, and B is alkyl containing from 0 to about 4 carbon atoms.

7. A polythiophene in accordance with **claim 6** wherein A contains from about 5 to about 25 carbon atoms, and B contains from 0 to about 4 carbon atoms.

8. A polythiophene in accordance with **claim 1** wherein a is from about 1 to about 7.

9. A polythiophene in accordance with **claim 1** wherein b is from about 1 to about 7.

10. A polythiophene in accordance with **claim 1** wherein d is zero.

11. A polythiophene in accordance with **claim 1** wherein d is 1.

12. A polythiophene in accordance with **claim 1** wherein n is from about 5 to about 5,000.

13. A polythiophene in accordance with **claim 1** wherein n is from about 5 to about 3,000.

14. A polythiophene in accordance with **claim 1** wherein n is from about 10 to about 1,000.

15. A polythiophene in accordance with **claim 1** wherein A is alkyl containing from about 6 to about 25 carbon atoms; B is hydrogen or alkyl containing from 1 to about 3 carbon atoms; D is arylene or dioxyarene, each containing from about 6 to about 40 carbon atoms, or alkylene or dioxyalkane, each containing from about 1 to about 20 carbon atoms.

16. A polythiophene in accordance with **claim 1** wherein A is alkyl containing from about 8 to about 12 carbon atoms, and B is a hydrogen atom.

17. A polythiophene in accordance with **claim 1** wherein A is alkyl containing from 5 to about 15 carbon atoms; B is a hydrogen atom; D is arylene; a, b, c, and m are independently selected from the numbers 1, 2, and 3; and d = 1.

18. A polythiophene in accordance with **claim 1** wherein A is alkyl containing from about 8 to about 12 carbon atoms; B is a hydrogen atom; D is arylene; a = c = m = 1; b = 2; and d = 1.

19. A polythiophene in accordance with **claim 1** wherein n is from about 5 to about 5,000.

20. A polythiophene in accordance with **claim 1** wherein the number average molecular weight ( $M_n$ ) of (III) is from about 10,000 to about 30,000, and the weight average molecular weight ( $M_w$ ) is from about 15,000 to about 100,000.



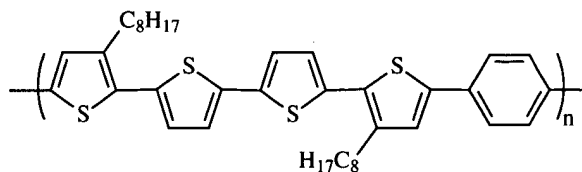
21. A polythiophene in accordance with **claim 1** wherein the number average molecular weight ( $M_n$ ) of (III) is from about 2,000 to about 100,000, and wherein the weight average molecular weight ( $M_w$ ) is from about 4,000 to about 500,000, each as measured by gel permeation chromatography using polystyrene standards.

22. A polythiophene in accordance with **claim 1** wherein A is hexyl heptyl, octyl, nonyl, decyl, undecyl, dodecyl, tridecyl, tetradecyl, or pentyldecyl.

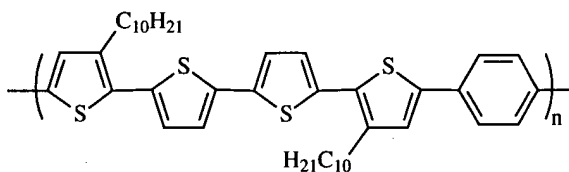
23. A polythiophene in accordance with **claim 1** wherein D is an arylene selected from the group consisting of phenylene, tolylene, xylylene, biphenylene, substituted biphenylene, fluorenylene, phenanthrenylene, dihydrophenanthrenylene, dibenzofuranediyl, dibenzothiophenediyl, and carbazole-diyl.

24. A polythiophene in accordance with **claim 1** wherein D is saturated linkage selected from the group consisting of alkylene, dioxyalkane, dioxyarene, and oligoethylene oxide.

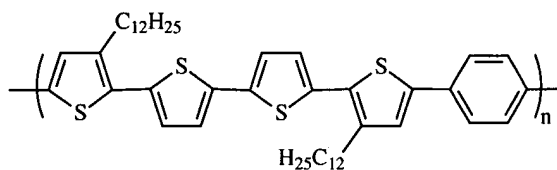
25. A polythiophene in accordance with **claim 1** wherein said polythiophene is represented by or encompassed by the following formulas, and wherein n represents the number of repeating segments, and is a number of from about 5 to about 4,000



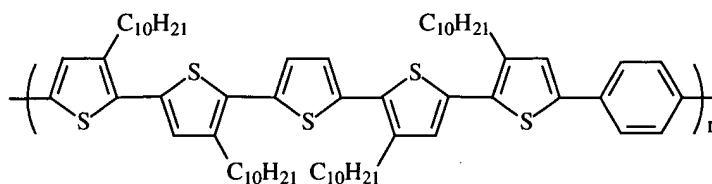
(1)



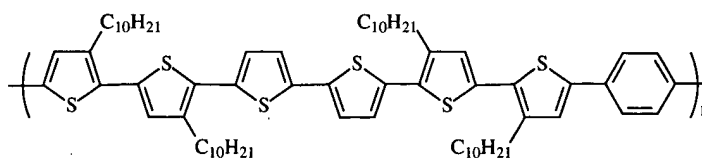
(2)



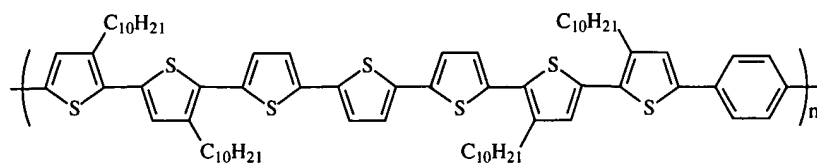
(3)



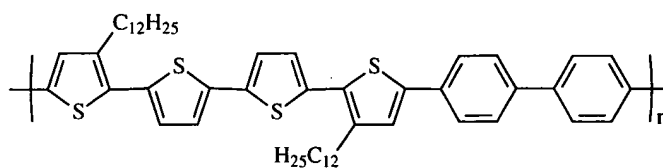
(4)



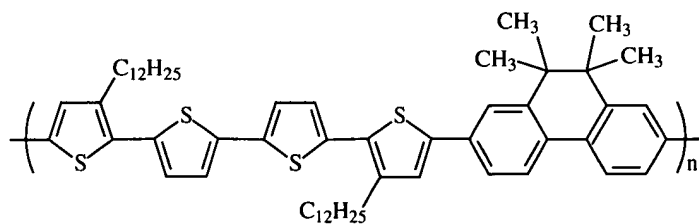
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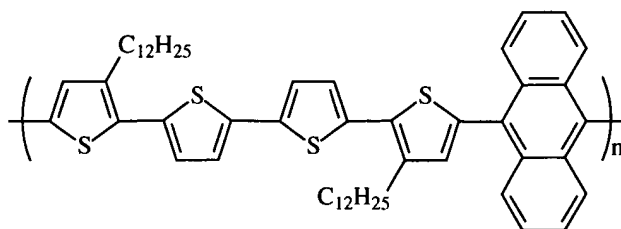
(6)



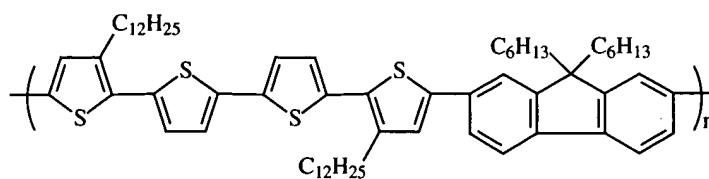
(7)



(8)

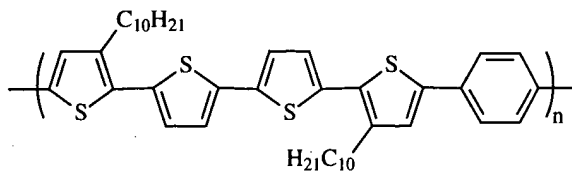


(9)

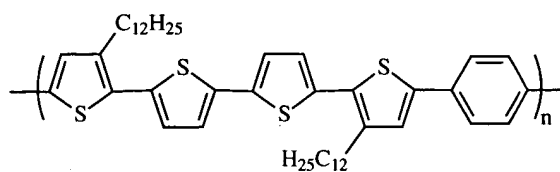


(10)

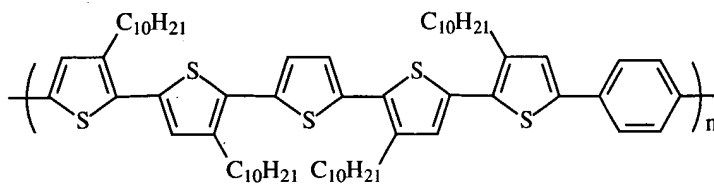
26. A polythiophene in accordance with **claim 1** wherein said polythiophene is



(2)



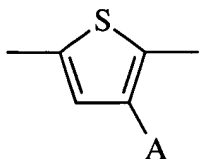
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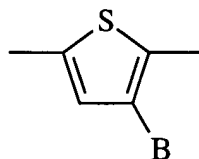
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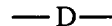
27. A polythiophene wherein the monomer segments thereof contain



(I)



(II)



wherein A is a side chain; B is hydrogen or a side chain; and D is a divalent segment, and wherein the number of A-substituted thienylene units (I) in the monomer segments is from about 1 to about 10, the number of B-substituted thienylene units (II) is from 0 to about 5, and the number of divalent segments D is 0 or 1.

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